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New Developments in the Tonoscope: Measurements on Correct Intonation in Singing

H. M. Williams
State University of Iowa

During the six years of the laboratory's existence, approximately 21,000 individual records have been secured involving such abilities as the perception of form, size, shape and color, motor control, learning, intelligence, language, vocabulary, apperception, memory, classification of objects, concepts of number, time, weight, emotional development and speech development. This number does not include special experiments worked out for advanced degrees, some of which include several thousand records on a single series of experiments with its variations.

The results of the six years' experimentation are now being analyzed and evaluated for the determination of principles that may be coördinated and integrated into more general principles or laws of mental development and the experimental psychology of the preschool child.

STATE UNIVERSITY OF IOWA.

NEW DEVELOPMENTS IN THE TONOSCOPE: MEASUREMENTS ON CORRECT INTONATION IN SINGING

H. M. WILLIAMS

A new modification of the Seashore tonoscope has been developed, similar to the phonograph form already described,[1] using the phonograph motor as a source of power but having a new scale which covers a whole octave, in steps of tenths of a tone. The instrument may be read in terms of twentieths of a tone. These units were chosen because they are close to the sensory limits for interval discrimination and because such units are comparable from one octave to another. The rows of dots representing the notes of the chromatic scale are made larger than the intermediate dots for the purpose of ease of reading. The scale is doubled upon itself for compactness and so that the "framing effect" [2] described by Seashore may be utilized.

A neon lamp unit [3] with a two stage vacuum tube amplified and a telephone transmitter have been substituted for the manometric flame and mercury arc light formerly in use. This lamp, together with an exponential horn attached to the transmitter has enormously increased the sensitivity of the instrument, so that the singer can now produce a tone at a considerable distance from the apparatus

1 Seashore, C. E. *Psychology of Musical Talent*, p. 193, Silver, Burdette, 1919.
2 Seashore, C. E. *The Tonoscope*, Psychol. Monog. XVII. No. 3, 1914 (Univ. of Iowa Studies in Psychology VI, p. 5).
3 This unit is manufactured commercially by C. F. Lorenz, E. Orange, New Jersey.

and still get a perfectly legible record of pitch on the tonoscope drum.

The instrument has been used for the investigation of the factors underlying voluntary control in the singing of intervals. A test for the measurement of pitch control in singing has been developed, including the following items: ability to reproduce a keynote; voluntary control (minimal change); correct intonation in a variety of situations, including singing the natural scale and certain simple, familiar melodies. From the results of the test diagnoses of individual difficulties may be made out and specific training given.

STATE UNIVERSITY,
IOWA CITY.

THE GROWTH OF THE HAND AND WRIST FROM BIRTH TO MATURITY

BIRD T. BALDWIN

This study gives a detailed analysis of the anatomical growth of children as indicated by the development of the carpal bones of the wrist, the epiphyses of the large bones of the forearm and hand, and the sesamoid bones of the hand and wrist. The study has been patiently carried on for four years with a view to discovering basic anatomical principles of growth from the particular angles of successive changes in carpal bone development.

In the investigation more than 1300 x-rays of boys and girls have been used ranging in age from birth to seventeen years inclusive, with a few cases above seventeen years. Of this number 624 boys and 528 girls were used in the main carpal area study. The others taken at a later date were used in the individual growth curves and in the study on epiphyses. All children are from a good class of English speaking people, the most of them infants from Iowa City, and pupils in the University preschools, elementary schools, and high school; healthy, normal children so far as it was possible to determine. A scale for determining anatomical age has been formulated.

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